

Optical Metrology of Aspheric and Freeform Mirrors, Phase I

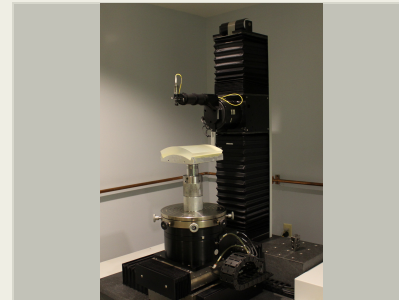
Completed Technology Project (2014 - 2014)



Project Introduction

The NASA Science Missions Directorate seeks technology for cost-effective high-performance advanced space telescopes for astrophysics and Earth science applications. These applications require instruments with large aperture light-weight highly reflecting mirrors and precision optical surfaces to gain a better understanding of how the universe works. The hard and soft X-ray mirrors have stringent surface requirements. If awarded a Phase I our plan would be to combine previous knowledge of OptiPro's UltraSurf metrology system with newly developed software. Our goal would be to create a robust solution for combining the measurement data of the mirrors with corrective machine grinding and polishing process toolpaths. This proposal includes the investigation utilizing non-contact probes on OptiPro's machining platforms to quantify the potential opportunities for in-situ mirror measurements.

Understanding these surface irregularities and what in the manufacturing processes causes them is critical for improving the current TRL's. OptiPro Systems will develop a metrology system and software, that would provide feedback for manufacturing these precision mirrors and include final metrology measurement of global form error and mid-spatial content. Comparison of in-situ and off-line metrology will be key for improving the manufacturing processes. We envision that the work performed in Phase I would lead to a software and metrology solution to be built and delivered to NASA if awarded a Phase II. OptiPro's technologically advanced optical manufacturing capabilities along with our support partnership with the University of Rochester Mechanical Engineering Department, gives us a very strong team and a clear path towards solving the difficult challenges for measuring these large complex mirrors and cylindrical shells. Our goal is to provide an innovative and complete manufacturing solution for the companies that are fabricating these optical components for NASA.



Optical Metrology of Aspheric and Freeform Mirrors Project Image

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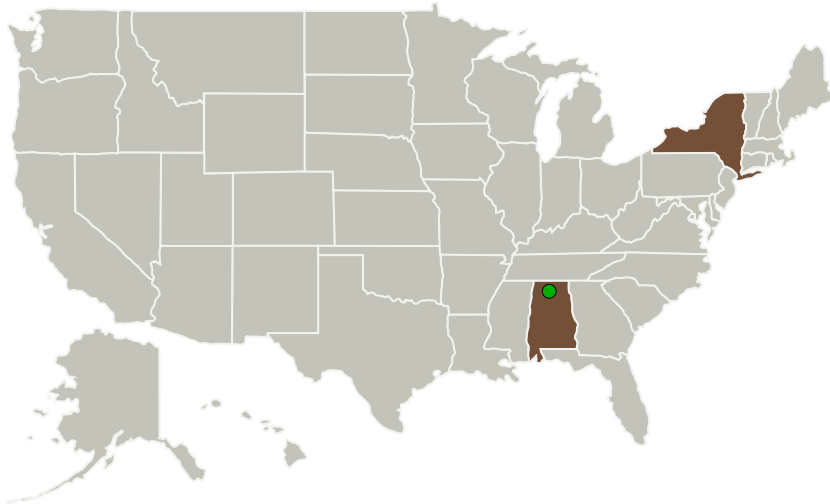
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Primary U.S. Work Locations and Key Partners



| Organizations Performing Work | Role | Type | Location |
|---------------------------------------|-------------------------|-------------|---------------------|
| OptiPro Systems LLC | Lead Organization | Industry | Ontario, New York |
| ● Marshall Space Flight Center (MSFC) | Supporting Organization | NASA Center | Huntsville, Alabama |

Primary U.S. Work Locations

Alabama New York

Project Transitions

**June 2014:** Project Start**December 2014:** Closed out**Closeout Documentation:**

- Final Summary Chart(<https://techport.nasa.gov/file/137643>)

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

OptiPro Systems LLC

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

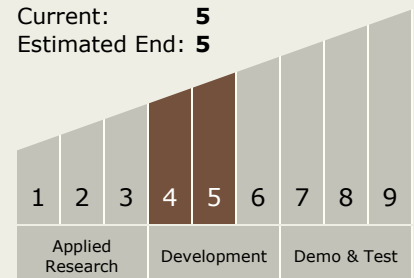
Carlos Torrez

Principal Investigator:

David Mohring

Technology Maturity (TRL)

Start: **4**
 Current: **5**
 Estimated End: **5**



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Images



Project Image

Optical Metrology of Aspheric and Freeform Mirrors Project Image
(<https://techport.nasa.gov/image/127178>)

Technology Areas

Primary:

- TX08 Sensors and Instruments
 - └ TX08.2 Observatories
 - └ TX08.2.1 Mirror Systems

Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System